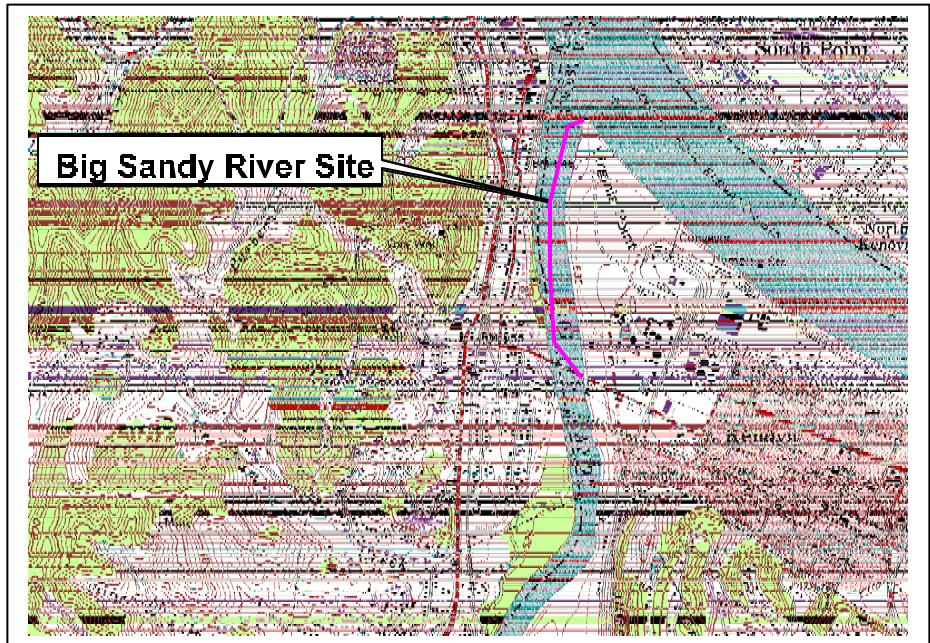


**BIG SANDY RIVER (WV-01)****1.0 Location**

The proposed Big Sandy Habitat Restoration project area is located in Wayne County, West Virginia near the confluence of the Big Sandy River and the Ohio River. The site is just west of the City of Kenova, West Virginia and is located within the Greenup Pool of the Ohio River. The Big Sandy River enters the Ohio River at Ohio River Mile (ORM) 316.9. The project site is within the jurisdiction of the Huntington District, U.S. Army Corps of Engineers (USACE).

**2.0 Project Goal, Description, and Rationale**

The primary goals of the Big Sandy Habitat Restoration project are to protect and reforest the heavily eroded shoreline along the lower 0.75 miles of the Big Sandy River. Along this portion of the river the shoreline is heavily eroded due to the high volume of commercial barge traffic and subsequent wave action against the shoreline. Riparian shoreline vegetation has become denuded and bank erosion is severe at this site.



**Big Sandy River Shoreline**

Restoration of the shoreline at this site will provide improved terrestrial riparian habitat, will reduce soil erosion and the associated river siltation, and provide aquatic habitat diversity that will improve the local fish populations and its associated recreational fishery.

Although this stretch of the Big Sandy River could be graded and protected with rip-rap, a bioengineering solution is preferred. Habitat restoration will be accomplished by stabilizing the riverbank using A-Jacks structures. The A-jack structures will stabilize the shoreline and allow the



natural regeneration of soft mast producing trees such as sycamore, silver maple, and willows. Since the shoreline is populated with mature trees, natural regeneration should occur rapidly. The use of willow and sycamore stakes to augment natural re-vegetation can be employed if desired.

### 3.0 Existing Conditions

**Terrestrial/Riparian Habitat:** The banks of the Big Sandy River in the project area are vegetated with a band of riparian trees. The dominant species present along the river bank include silver maple (*Acer saccharinum*) and sycamore (*Platanus occidentalis*). The shoreline in the project area is adjacent to the town of Kenova, West Virginia. Most of the area adjacent to the river is a municipal park and associated boat ramp. The river bank is principally composed of mud and sand substrate. The northeastern portion of the area has some rock rip-rap in place to aid in bank stabilization. Many of the trees along the river bank have exposed root masses, as a result of shoreline erosion.



**Big Sandy River shoreline vegetation**



**Riprap along northeastern shoreline**



**Mouth of the Big Sandy River**

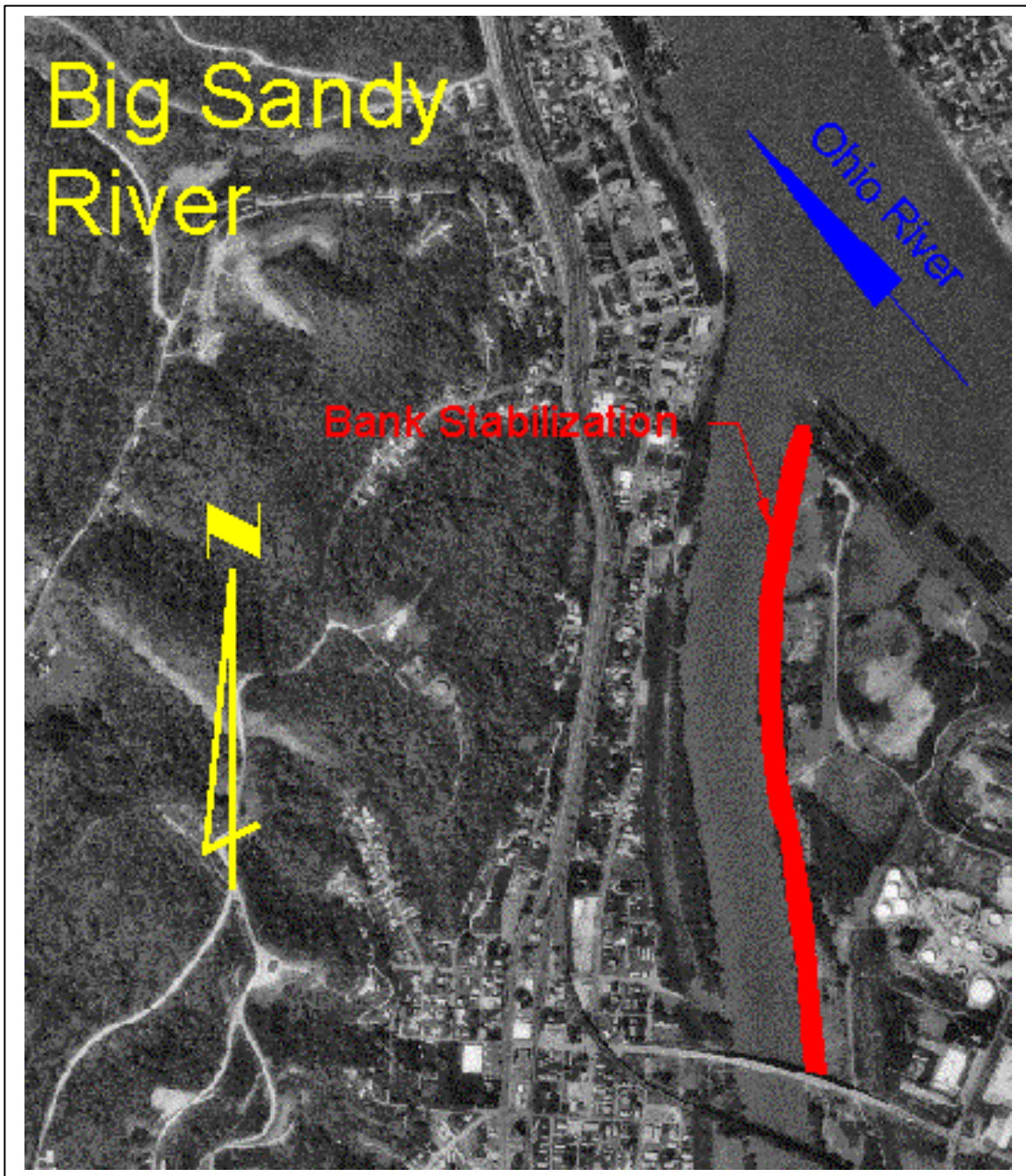
**Aquatic Habitats:** The Big Sandy River near the mouth of the Ohio River is a large river which supports commercial navigation. The river bottom and banks are comprised principally of mud and sand. The main channel is approximately 12-25 feet deep. There is a shallow narrow shelf that is less than 3 feet deep adjacent to the riverbank that drops to 10–12 feet in depth approximately 20-30 feet from the shoreline. Habitat diversity is minimal within the project area as the channel is fairly uniform and in-stream structure (e.g. fallen trees, rock piles, etc.) is uncommon.

**Wetlands:** There are no jurisdictional wetlands present in the immediate vicinity of the proposed Big Sandy project area.

**Federally-Listed Threatened and Endangered Species:** According to the U.S. Fish and Wildlife Service (USFWS), there is only one federally-listed threatened or endangered species in Wayne County, West Virginia. The Indiana bat (*Myotis sodalis*), an endangered species, is known to occur in Wayne County. Indiana bats may use the riparian floodplain habitats within the project area as summer foraging or roosting habitat.



#### 4.0 Project Diagram



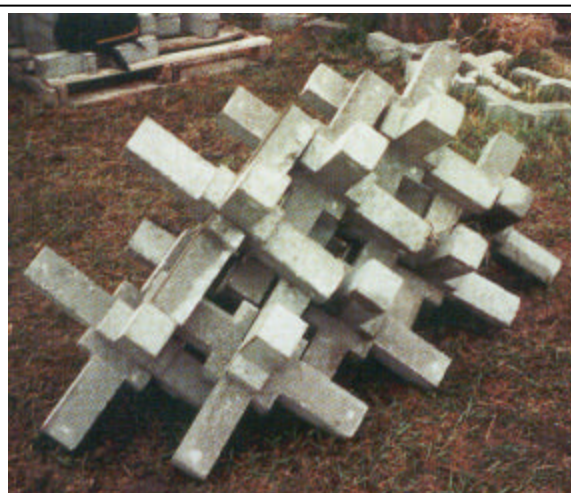
#### 5.0 Engineering Design, Assumptions, and Requirements

##### 5.1 Existing Ecological/Engineering Concern

The Big Sandy River is characterized by heavily eroded banks due to the volume of commercial barge traffic along the river. Riparian shoreline vegetation is sparse and soil erosion high at this location. Many of the trees along the river bank have exposed root masses resulting from shoreline erosion. The northeastern portions of the riverbank has some rock riprap in place to aid in bank stabilization.

## 5.2 Shoreline Stabilization

River currents in conjunction with barge traffic are actively eroding the Big Sandy channel bank. The erosion has produced steep banks with little or no vegetation and a biostabilization approach to bank protection is preferred to simple bank hardening (rip-rap). A-jacks® by Armortec, or similar structures, will be used as structural bank reinforcement at the underwater base of eroding bank combined with revegetation of the upper slope. A-jacks® are assembled into a highly porous, interlocking matrix. The voids created by the interlocking A-jacks®, or similar structures, are filled with soil to establish a foundation to support woody vegetation above the normal pool elevation of the Ohio River. A geotextile fabric would be used in conjunction with an aggregate base to reduce the removal of fine soils while the root systems are developing. Light mast producing trees such as black willow, cottonwood, and sycamore will be allowed to reseed/regenerate naturally in the structure voids. If necessary, additional cuttings and rooted stock can be placed in and behind the A-jacks® matrix along the earthen berm to augment natural revegetation.



**A-jacks Structures**

## 5.3 Planning/Engineering Assumptions

- ◆ Average channel velocities are 3 feet per second.
- ◆ Armortec's A-jacks® AJ-24 units would be used to stabilize the toe of the eroding slope. The unit weighs 78 pounds and is small enough to be assembled and placed by hand.
- ◆ Two rows of A-jacks® would be toed into the river bed a minimum of 1.5 feet deep.
- ◆ A-jacks® would be interconnected in rows along the toe trench. Two rows would be used at the base, with a single row on top.
- ◆ Backfill sediment for the voids would be taken from onsite.

## 6.0 Cost Estimate (Construction):

Engineering costs for the proposed project are contained on Table 1. A detailed MCACES cost estimate for the proposed project is included in Appendix C.

<b>Table 1. Engineering Costs.</b>	
<b>Item</b>	<b>Cost</b>
Bank Shaping and Toe Excavation	\$2,600
A-jacks	\$140,300
Geotextile Fabric	\$45,900
Shipping of A-jacks®	\$8,600
Mobilization	\$15,000
<b>TOTAL</b>	<b>\$212,400</b>

## 7.0 Schedule:

The estimated construction time for this project is shown on Table 2.

<b>Table 2. Construction Schedule.</b>	
<b>Item</b>	<b>Time</b>
Bank Shaping and Toe Excavation	6 Days
A-jacks	25 Days
Geotextile Fabric	14 Days
Shipping of A-jacks <sup>®</sup>	10 Days
Mobilization	4 Days
<b>TOTAL</b>	<b>59 Days</b>

## 8.0 Expected Ecological Benefits

**Terrestrial/Riparian Habitats:** The impacts of the Big Sandy habitat restoration project would result in beneficial impacts to the local riparian communities. Stabilization of the shoreline and re-vegetation will result in a more stable riparian shoreline community.

**Aquatic Habitats:** Long-term beneficial impacts to aquatic resources would be expected as a result of implementing the proposed project. Shoreline stabilization and riparian re-vegetation would result in long-term beneficial impacts to fish populations due to reduced erosion/siltation and increased habitat diversity. The addition of the shoreline A-Jack structures for shoreline stabilization and habitat enhancement will provide habitat for macroinvertebrate colonization, velocity shelters for small fishes, and habitat variability in the project area.

**Wetlands:** There would be no beneficial impacts to jurisdictional wetlands as a result of implementing the proposed project.

**Federally-Listed Threatened and Endangered Species:** There would be minor long-term beneficial impacts to the Indiana bat as a result of implementing the proposed project. The riparian habitat and mature bottomland trees within the project area will be protected which would result in improved foraging/roosting conditions for the Indiana bat.

**Socioeconomic Resources:** There would be minor short-term and long-term beneficial impacts to socioeconomic resources as a result of implementing the proposed project. The short-term beneficial impacts would be related to costs and local expenditures associated with the construction of the project. Long-term socioeconomic benefits would be realized through improved recreational fishing opportunities. Long-term indirect beneficial impacts will be realized through local expenditures for fishing gear, food, gas, and other associated needs.

## 9.0 Potential Adverse Environmental Impacts

**Terrestrial/Riparian Habitats:** There would be short-term adverse impacts to terrestrial/riparian resources as a result of implementing the proposed project. There would be short-term adverse impacts to terrestrial species from construction-related noise and disturbance. Considering the existing high volume of disturbance from the adjacent barge traffic along the Big Sandy and Ohio Rivers and recreational boat usage in the area, it is likely that the increased noise/disturbance impacts would be very minor. There would be short-term impacts to shoreline vegetation during the shoreline stabilization portions of the project.

**Aquatic Habitats:** There would be a potential for adverse affects to aquatic species, especially immobile benthic invertebrates and young-of-the-year fishes during the shoreline stabilization portion of the project. Localized populations of benthic invertebrates could be directly disturbed during the construction operation. In addition, sensitive aquatic species immediately downstream from the site could be adversely impacted by degraded water quality associated with displaced sediments, however these adverse impacts to aquatic species would be short term.

**Wetlands:** There would be no reasonably foreseeable adverse impacts to jurisdictional wetlands as a result of implementing the proposed project.

**Federally-Listed Threatened and Endangered Species:** The potential for minor short-term adverse impacts to Indiana bat exist as a result of implementing the proposed project. Some shoreline vegetation within the riparian band adjacent to the river will be removed as part of the shoreline stabilization program. The short-term loss of a portion of the riparian corridor within the project area could result in minor adverse impacts to the Indiana bat. Overall, however, the re-vegetation associated with the project will result in long-term improvements to foraging/roosting conditions for the Indiana bat.

**Socioeconomic Resources:** There would be no reasonably foreseeable adverse socioeconomic impacts as a result of implementing the proposed project.

## 10.0 Mitigation

Minor impacts associated with site restoration may occur during the construction of this project, however, no significant adverse impacts are expected. The use of best management practices and proper construction techniques would minimize adverse water quality impacts.

Potential adverse impacts to Indiana bats could be eliminated/minimized by conducting all vegetation clearing between October 1 and April 1.

## 11.0 Preliminary Operation and Maintenance Costs:

Table 3. Operation and Maintenance Costs		
Maintenance	Frequency	Costs
Bank Protection Maintenance	25 years	\$50,000

## 12.0 Potential Cost Share Sponsor(s)

- ◆ State of West Virginia
- ◆ Barge/towing industry
- ◆ Local industry

## 13.0 Expected Life of the Project

It is anticipated that the shoreline stabilization, and shoreline re-vegetation would provide meaningful habitat improvements at the project site for a period of 25 to 50 years before repair/replacement of the rock structures would be required.

## 14.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at this concept site were visually assessed during a site visit on June 16, 1999.



### Site Inspection Findings

The project location is in Wayne County, West Virginia and includes the lower one mile of the Big Sandy River which flows north where it joins the Ohio River. Catlettsburg, Kentucky is on the west bank of the Big Sandy River about one mile upstream from its juncture with the Ohio River and Kenova, West Virginia is on the east bank of the Big Sandy River just across the river from Catlettsburg. The State of Kentucky is on the west side of the Big Sandy River and the Ohio River is to the north. Kenova Terminal is located to the east and Kenova Park is south of the project. A barge mooring area is found on the Ohio River near the mouth of the Big Sandy River.

The following environmental conditions were considered when conducting the June 16, 1999 project area inspection:

- |                                      |                             |
|--------------------------------------|-----------------------------|
| ◆ Suspicious/Unusual Odors;          | ◆ Impoundments/Lagoons;     |
| ◆ Discolored Soil;                   | ◆ Drum/Container Storage;   |
| ◆ Distressed Vegetation;             | ◆ Electrical Transformers;  |
| ◆ Dirt/Debris Mounds;                | ◆ Standpipes/Vent pipes;    |
| ◆ Ground Depressions;                | ◆ Surface Water Discharges; |
| ◆ Oil Staining;                      | ◆ Power or Pipelines;       |
| ◆ Above Ground Storage Tanks (ASTs); | ◆ Mining/Logging; and       |
| ◆ Underground Storage Tanks (USTs);  | ◆ Other.                    |
| ◆ Landfills/Wastepiles;              |                             |

Commercial navigation structures and a barge mooring area are located near the mouth of the Big Sandy River. Although not observed, there is the possibility of above ground and underground fuel storage tanks in association with the barge mooring area. Site observations did not reveal any of the environmental conditions listed above in the project area. A database search of HTRW records maybe appropriate if land transfers are considered due to potential HTRW activities in the project vicinity.

### 15.0 Property Ownership & River Access

Selected data on properties immediately adjacent to the concept site was collected from the county courthouse of the respective county of each site. Data collected included map and parcel identification number, property owner's name and mailing address, acreage of the potentially affected parcel, and market value of the parcel. This procedure involved obtaining a plat or parcel map of the site and surrounding area which identified each parcel with a corresponding map and parcel number. The map\parcel identification number was subsequently used to determine the property owner's name and mailing address from records in the County Assessor's or County Auditor's office.

The market value of each parcel as contained in the property tables reflects the assessed valuation to supposedly market value ratio used by the State for taxation purposes. These assessed values reflect 1998 assessments. The assessed valuation ratio is 60 percent for West Virginia.

The above ratio was used to approximate the market value of each property. However, in many instances the resultant market value calculated under the above procedure is considerably below the actual value of the land in the real market. Local real estate brokers could provide a more accurate estimate of actual land values.

The collected property data indicate that the adjacent land is owned by private corporations. Agreements with these entities would be required prior to undertaking the proposed project.



<b>Table 4. Property Characteristics</b>				
<b>Site Name:</b>		<b>Big Sandy River</b>		
<b>Location:</b>		<b>Wayne County, West Virginia</b>		
<b>Map/Parcel Number</b>	<b>Owner</b>	<b>Mailing Address</b>	<b>Market Value</b>	<b>Acreage</b>
4/2.1	Kenova Terminal Company	200-Nine Parkway Center Pittsburgh, PA 15220	\$ 268,000*	10.20
4/2.2	(same as above)	(same as above)	\$ 18,500	16.50
4/2.3	(same as above)	(same as above)	\$ 10,500	9.34
4/2.4	(same as above)	(same as above)	\$ 2,000	1.76
4/2.5	(same as above)	(same as above)	\$ 7,900	7.02
4/2.6	(same as above)	(same as above)	\$ 800	.69
4/2.7	(same as above)	(same as above)	\$ 8,700	4.83
4/2.8	(same as above)	(same as above)	\$ 1,900	1.04
4/2.9	(same as above)	(same as above)	\$ 3,000	1.67
4/2.10	(same as above)	(same as above)	\$ 400	21.00
4/2.11	(same as above)	(same as above)	\$ 8,900	4.99
4/2.12	(same as above)	(same as above)	\$ 3,900	2.02
4/3	Charles\Juanita White (Kenova Terminal has ¼ interest)	P.O. Box 425 Huntington, WVA 25709	\$ 27,666	7.98
7/5	Ashland Oil & Refinery Co.	Box 14000 Lexington, KY 40512		
* Denotes improvements on property.				

## 16.0 References

USFWS, 1983	U.S. Fish and Wildlife Service, 1983. Recovery Plan for the Indiana bat ( <i>Myotis sodalis</i> ).
USFWS, 1999	U.S. Fish and Wildlife Service, July 8, 1998. Federally Endangered, Threatened and Proposed Species, West Virginia.

**APPENDIX A      Threatened & Endangered Species**

**APPENDIX B Plan Formulation and Incremental Analysis Checklist****Project Site Location:**

The proposed Big Sandy Habitat Restoration project area is located in Wayne County, West Virginia near the confluence of the Big Sandy River and the Ohio River. The site is just west of the City of Kenova, West Virginia and is located within the Greenup Pool of the Ohio River. The Big Sandy River enters the Ohio River at Ohio River Mile (ORM) 316.9. The project site is within the jurisdiction of the Huntington District, U.S. Army Corps of Engineers (USACE).

**Description of Plan Selected:**

The primary goals of the Big Sandy Habitat Restoration project are to protect and reforest the heavily eroded shoreline along the lower 0.75 miles of the Big Sandy River. Restoration of the shoreline at this site will provide improved terrestrial riparian habitat, will reduce soil erosion and the associated river siltation, and provide aquatic habitat diversity that will improve the local fish populations and it's associated recreational fishery.

Habitat restoration will be accomplished by: 1) stabilizing the river bank using A-Jacks structures; 2) creating a series of small near-shore jetties and vanes, and 3) revegetating the eroding shoreline after the shoreline has been stabilized.

**Alternatives of the Selected Plan:**

Smaller Size Plans Possible? Yes and description

Reduce the amount shoreline to be restored.

Larger Size Plan Possible? Yes and description

Increase the amount of shoreline to be restored.

Other alternatives? Entire shoreline could be riprapped to reduce erosion

Restore/Enhance/Protect Terrestrial Habitats? ☒ Yes Objective numbers met ☒ T1, T3

Restore, Enhance, & Protect Wetlands? ☐ No Objective numbers met ☐

Restore/Enhance/Protect Aquatic Habitats? ☒ Yes Objective numbers met ☒ A8

Type species benefited: Variety of fish species, invertebrates, and riparian vegetation

Endangered species benefited: Indiana bat

Can estimated amount of habitat units be determined: Approximately 2100 linear feet of shoreline will be restored

**Plan acceptable to Resources Agencies?**

U.S. Fish & Wildlife Service?

State Department of Natural Resources? Yes – West Virginia DNR

Plan considered complete? Connected to other plans for restoration?

Real Estate owned by State Agency? Federal Agency?

Real Estate privately owned? Adjacent land is privately owned.

If privately owned, what is status of future acquisition Acquisition is not necessary.





**Does this plan contribute significantly to the ecosystem structure or function requiring restoration? What goal or values does it meet in the Ecosystem Restoration Plan?**

Restores eroding shoreline, reduces siltation/turbidity, restores riparian habitat, and provides habitat diversity for aquatic species

**Is this restoration plan a part of restoration projects planned by other agencies? (i.e. North American Waterfowl Management Plan, etc.)**

No

**In agencies opinion is the plan the most cost effective plan that can be implemented at this location?**

**Can this plan be implemented more cost effectively by another agency or institution?**

**Yes / No**

**Who:**

**From an incremental cost basis are there any features in this plan that would make the project more expensive than a typical project of the same nature? For embayment type plans is there excessive haul distance to disposal site? More expensive type disposal? Spoil that requires special handling/disposal?**

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**Potential Project Sponsor:**

**Government Entity:** \_\_\_\_\_

**Non-government Entity** \_\_\_\_\_

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Corps Contractor \_\_\_\_\_ Date \_\_\_\_\_

U.S. Fish & Wildlife Representative \_\_\_\_\_ Date \_\_\_\_\_

State Agency Representative \_\_\_\_\_ Date \_\_\_\_\_

U.S. Army Corps of Engineers Representative \_\_\_\_\_ Date \_\_\_\_\_

## **Terrestrial Habitat Objectives**

- T1     Riparian Corridors
- T2     Islands
- T3     Floodplains
- T4     Other unique habitats (canebrakes, river bluffs, etc.)

## **Wetland Habitat Objectives**

- W1     Forested Wetlands: Bottomland Hardwoods
- W2     Forested Wetlands: Cypress/Tupelo Swamps and other unique forested wetlands
- W3     Scrub/Shrub Emergent Wetlands: isolated from the river except during high water and contiguous (includes scrub/shrub wetlands in embayments and island sloughs)

## **Aquatic Habitat Objectives**

- A1     Backwaters (sloughs, embayments, oxbows, bayous, etc.)
- A2     Riverine submerged and aquatic vegetation
- A3     Sand and gravel bars
- A4     Riffles/Runs (tailwaters)
- A5     Pools (deep water, slow velocity, soft substrate)
- A6     Side Channel/Back Channel Habitat
- A7     Fish Passage
- A8     Riparian Enhancement/Protection



**APPENDIX C      Micro Computer-Aided Cost Engineering System (MCACES)**